

## 8.26 WORCESTER COUNTY

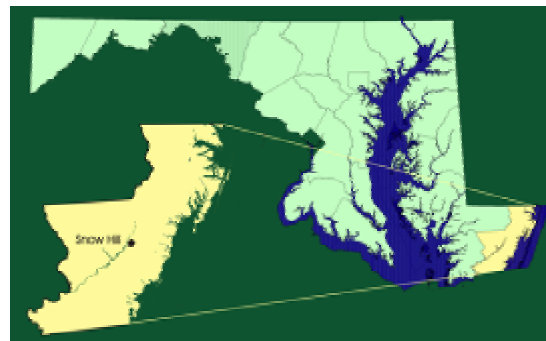
This chapter presents information about stream conditions of potential management interest in Worcester County based on the 2000-2004 Maryland Biological Stream Survey (MBSS) results. Information from MBSS data collected between 1994 and 1997 can be found in MDNR 2001x.

### 8.26.1 Ecological Health

Based on the three ecological health indicators used by the MBSS, the overall condition of Worcester County streams during 2000-2004 was Poor (Figure 8-213). The FIBI results indicate that 7% of the streams in the county were in Good condition, and 7% rated Good using the BIBI. In contrast, 74% of the streams in the county scored as Poor or Very Poor using the CBI, while about 7% scored as Good and 18% scored as Fair. It should be noted that 49% of stream miles were not rated for fish (FIBI) because some sites met the criteria for blackwater streams and had Poor or Very Poor FIBI scores. There are no remaining blackwater streams in Maryland healthy enough to serve as reference sites for FIBI development, so these streams were not rated for fish.

Sites with high IBI scores were confined to the western border of the county. In contrast, sites in the Coastal Bays watersheds were most often rated as Very Poor. The highest rated stream in Worcester County using the Combined Biotic Index (CBI) was Nassawango Creek, while the lowest rated streams included Millville Creek, Wagram Swamp Branch and Crippen Branch (Table 8-51). Based on Stream Waders data, sites rated as Very Poor for benthic macroinvertebrates outnumbered all other ratings combined in most watersheds in the county (Table 8-52). No Stream Wader sites in Worcester County were rated Good.

One MBSS Sentinel site was located in Worcester County, Millville Creek. Sentinel sites were chosen to provide a representation of the best remaining streams around the state and track natural variations in stream health. In this case, Millville Creek was chosen as a Sentinel site in spite of low biotic index scores, because it represents one of the least impacted blackwater (a stream with high dissolved organic carbon and low pH) remaining in Maryland. Where possible, Sentinel sites are located in watersheds with as much protected land as possible, or in areas projected to become degraded from development at a slower pace. More information about the MBSS Sentinel stream network is found in: 2000-2004 Maryland Biological Stream Survey Volume 11: Sentinel Sites ([http://www.dnr/Maryland.gov/streams/pubs/ea05-8\\_sentinel.pdf](http://www.dnr/Maryland.gov/streams/pubs/ea05-8_sentinel.pdf)).



### 8.26.2 Physical Habitat

#### 8.26.2.1 Overall Condition

Based on the Physical Habitat Index (PHI), 9% of the streams in Worcester County had Minimally Degraded habitat, 62% had Partially Degraded habitat, and 30% had Degraded or Severely Degraded habitat (Figure 8-214). Most of the Severely Degraded sites were located in the northern portion of the county.

#### 8.26.2.2 Trash

Nearly 86% of the stream miles in Worcester County were rated Optimal for trash (Figure 8-215). In contrast, 5% of streams were rated as Marginal or Poor for trash. No strong geographic pattern was evident.

#### 8.26.2.3 Channelization

About 68% of the stream miles in Worcester County were channelized to some extent (Table 8-4). The type of channelization found at MBSS sites was earthen ditches. No geographic pattern in channelization was evident (Figure 8-216).

#### 8.26.2.4 Inadequate Riparian Buffer

Nearly 9% of the stream miles in Worcester County had no riparian buffers during the 2000-2004 MBSS (Table 8-3). In addition, 15% of stream miles had severe breaks in existing riparian buffers. No geographic trend in sites with no buffer or buffer breaks was evident (Figure 8-217). Additional information about buffer breaks, analyzed by county, is provided in: 2000-2004 Maryland Biological Stream Survey Volume 10: Riparian Zone Conditions ([http://www.dnr/Maryland.gov/streams/pubs/ea05-7\\_biodiv.pdf](http://www.dnr/Maryland.gov/streams/pubs/ea05-7_biodiv.pdf)).

### 8.26.2.5 Eroded Banks/Bedload Movement

Over 77% of the stream miles in Worcester County were rated as having minimal (Optimal) bank erosion (Figure 8-218). In contrast, 4% of streams were rated Poor for bank erosion, and an additional 11% were rated as Marginal. One likely reason for the low amount of bank erosion in the county is the amount of channelization via ditching that has occurred. Bank erosion problems were most frequent in the northern half of the county.

Nearly 55% of the stream miles in Worcester County had either minor bar formation or were devoid of bars (Figure 8-218). An additional 41% were rated as having moderate bar formation, while 3% had extensive bar formation. No geographic trend was evident.

### 8.26.3 Key Nutrients

#### 8.26.3.1 Nitrate-Nitrogen

Nearly 60% of the stream miles in Worcester County had nitrate-nitrogen levels below 1 mg/l (Figure 8-219). Of the remaining 45% of stream miles, over 6% had levels above 5 mg/l, the threshold at which biological impacts have been documented. In general, nitrate-nitrogen levels appeared to be slightly higher in the northern half of the county.

#### 8.26.3.2 Total Phosphorus

In contrast to nitrate-nitrogen, the majority of stream miles (66%) in Worcester County had elevated levels of total phosphorus (Figure 8-220). Nearly 38% had levels above the threshold at which biological effects may occur. In general, total phosphorus levels appeared to be slightly higher in the northern half of the county.

### 8.26.4 Stream and River Biodiversity

To provide a means to prioritize stream systems for biodiversity protection and restoration within each county and on a statewide basis, a tiered watershed and stream reach prioritization method was developed. Special emphasis was placed on state-listed species, stronghold watersheds for state-listed species, and stream reaches with one or more state-listed aquatic fauna. Fauna considered included stream salamanders, freshwater fishes, and freshwater mussels. Rare, pollution-sensitive benthic macroinvertebrates collected during the 1994-2004 MBSS were also used to identify the suite of watersheds necessary to conserve the full array of known stream and river biota in

Maryland. A complete description of the biodiversity ranking process is found in: 2000-2004 Maryland Biological Stream Survey Volume 9: Stream and Riverine Biodiversity ([http://www/dnr/Maryland.gov/streams/pubs/ea05-6\\_biodiv.pdf](http://www/dnr/Maryland.gov/streams/pubs/ea05-6_biodiv.pdf)).

Of the four watersheds found in Worcester County, Dividing Creek/Nassawango Creek was classified as Tier 1, meaning that this watershed serves as a stronghold for one or more state listed aquatic species (Figure 8-221). The Upper Pocomoke River was classified as Tier 2, meaning that this watershed serves as a stronghold for one or more non-state listed species of Greatest Conservation Need (GCN), and also has one or more state-listed aquatic species. In contrast, the Assawoman Bay/Isle of Wight Bay/Sinepuxent Bay/Newport Bay/Chincoteague Bay watershed was among the lower ranking for stream and river biodiversity in the state (64<sup>th</sup> of 84). Any reaches that had either state-listed or GCN species, or high intactness values were highlighted to facilitate additional emphasis in planning restoration and protection activities.

### 8.26.5 Stressors

At 73% of stream miles, the most extensive stressor characterized by the MBSS in Worcester County during the 2000-2004 MBSS was non-native terrestrial plants in the riparian zone (Figure 8-5). Other stressors found were: channelized streams (68% of stream miles); acid deposition (55% of stream miles); non-native aquatic fauna (present in 43% of stream miles); eroded banks (15% of stream miles); streams with > 5% urban land use upstream (10% of stream miles); streams with no riparian

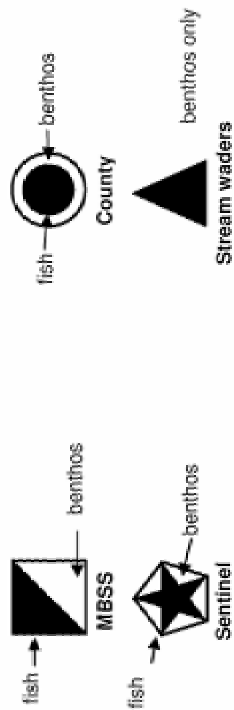
#### AN IMPORTANT NOTE ON BIODIVERSITY MANAGEMENT

Perhaps the largest ongoing natural resources restoration and protection effort in Maryland is associated with the Chesapeake Bay. In most cases, freshwater biodiversity is not specifically considered during placement and prioritization of Bay restoration and protection projects. In this report and in the more detailed volume in the series on aquatic biodiversity, a system of biodiversity ranking is presented to provide counties and other stewards with a means to plan appropriate protection and restoration activities in locations where they would most benefit stream and river species. Given the historically low level of funding for biodiversity protection and restoration in Maryland and elsewhere, the potential benefit of incorporating freshwater biodiversity needs into other efforts is quite large.

However, it is important to note that although freshwater taxa are the most imperiled group of organisms in Maryland, other groups and individual species not typically found in freshwater habitats are also at high risk and constitute high priority targets for conservation. In addition, freshwater taxa that prefer habitats such as small wetlands may not be well-characterized by the ranking system employed here. To conserve the full array of Maryland's flora and fauna, it is clearly necessary to use other, landscape-based tools and consider factors such as maintaining or reconnecting terrestrial travel corridors.

buffer (9%); high nitrate-nitrogen (6%); and low dissolved oxygen (8%).

### Symbol types and data sources



**Colors used in symbols**

Very Poor ● Good

Very Poor



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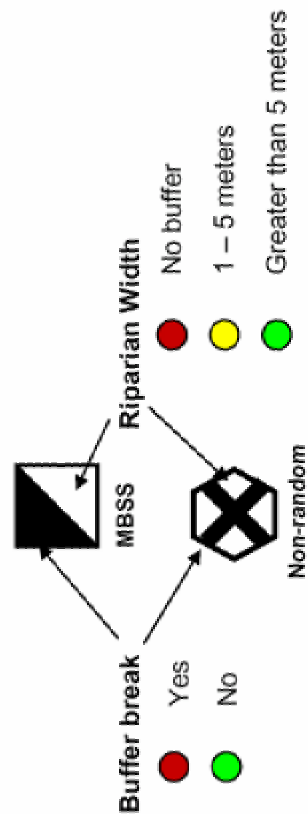
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MBSS Round 1 data are shown in muted colors

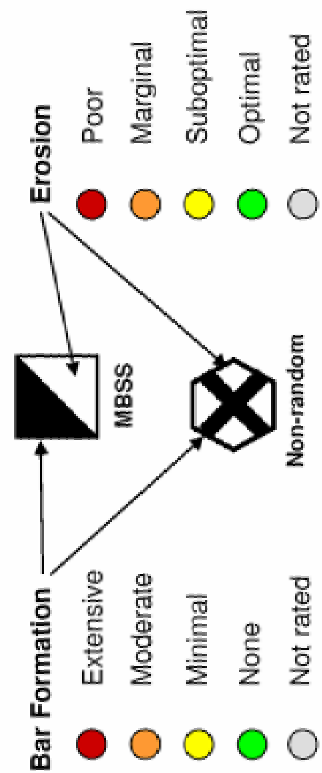
### Riparian Buffer Condition

### Symbol types and data sources



## Channel Condition

### Symbol types and data sources



Tier 1:	Stronghold watershed (most robust remaining population) for one or more state-listed fish, aquatic herpetofauna, or freshwater mussels.
Tier 2:	Stronghold watershed for one or more non-state listed species of greatest conservation need (GCN) fish, aquatic herpetofauna, or freshwater mussels, that also had state-listed fish, aquatic herpetofauna, or freshwater mussels present.
Tier 3:	Stronghold watershed for one or more non-state listed GCN fish, aquatic herpetofauna, or freshwater mussels, no state-listed fish, aquatic herpetofauna, or freshwater mussels present.
Tier 4:	Non-stronghold watershed with one or more state-listed fish, aquatic herpetofauna, or freshwater mussels present.
Tier 5:	Not of the above, but a biodiversity conservation watershed. In other words, part of the network of watersheds that must be conserved to keep all native fishes, aquatic herpetofauna, freshwater mussels, and rare, pollution sensitive benthic macroinvertebrates extant in Maryland.
Tier 6:	Not of the above.

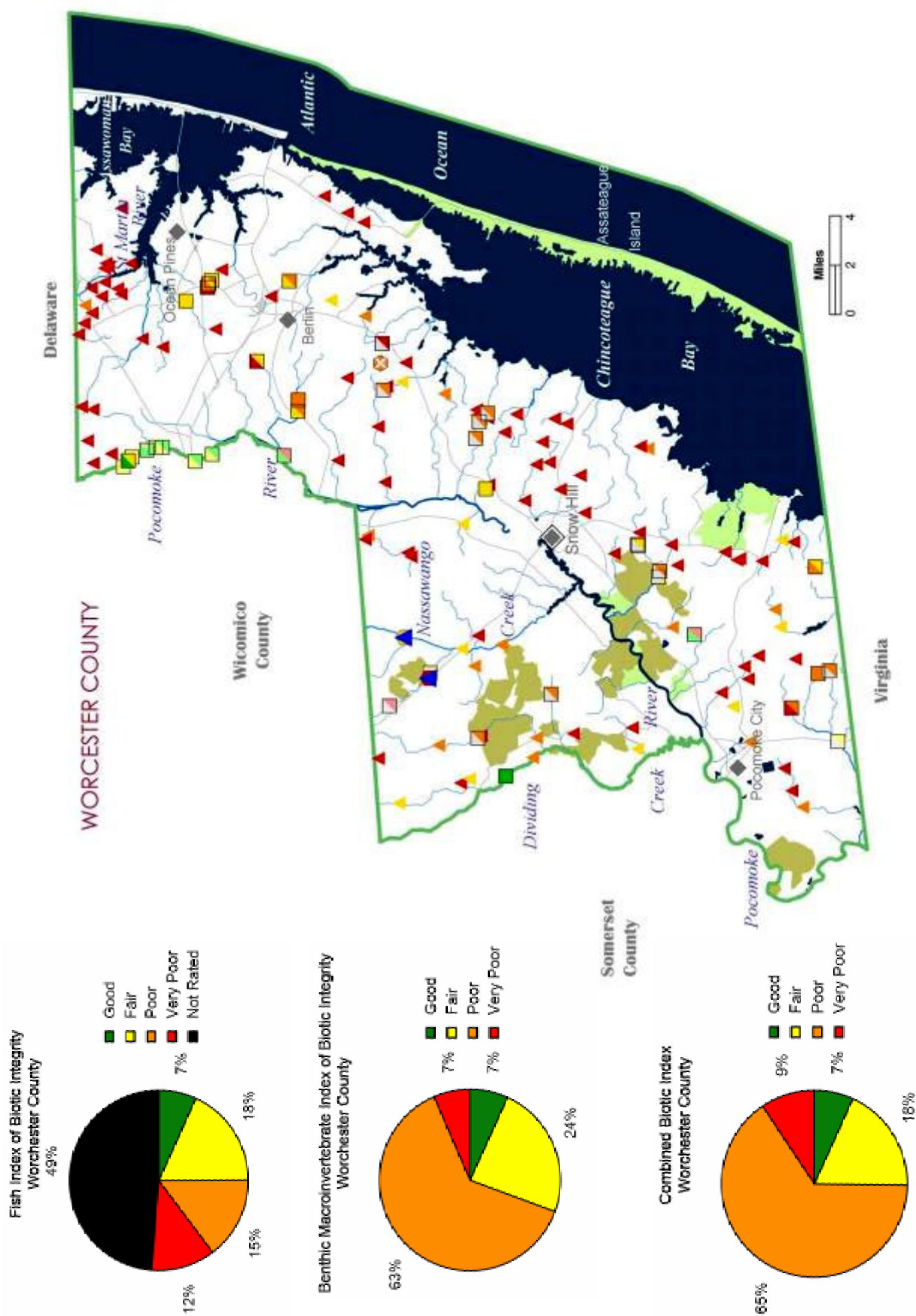


Figure 8-213. Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biotic Integrity (FIBI) pie charts and map of stream health for Worcester County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie charts represent 2000-2004 data only, Combined Biotic Index pie chart represents mean of FIBI and BIBI)



Table 8-52. Stream Waders sites sampled Worcester County during 2000-2004, ranked by Family-level Benthic Index of Biotic Integrity

Worcester County - Stream Wader Sites				
WATERSHED	# GOOD	# FAIR	# POOR	# VERY POOR
Assawoman Bay	0	0	0	1
Chincoteague Bay	0	2	3	25
Dividing Creek	0	3	3	6
Isle of Wight Bay	0	0	1	17
Pocomoke River Lower	0	2	3	18
Nassawango Creek	0	1	2	2
Newport Bay	0	3	2	3
Sinepuxent Bay	0	0	0	3
Pocomoke River Upper	0	0	1	18

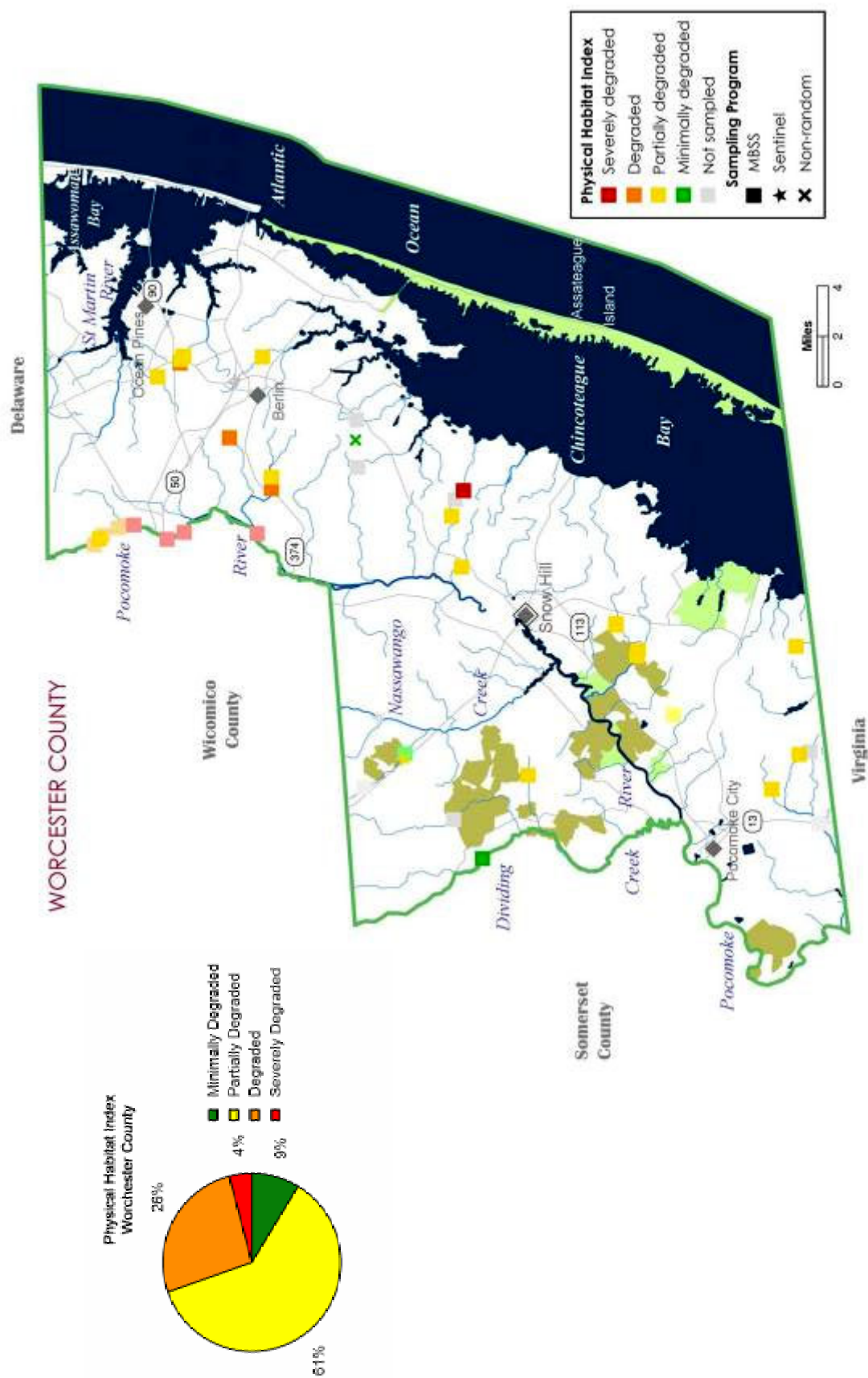


Figure 8-214. Physical Habitat Index (PHI) pie chart and map of stream habitat quality for Worcester County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only)

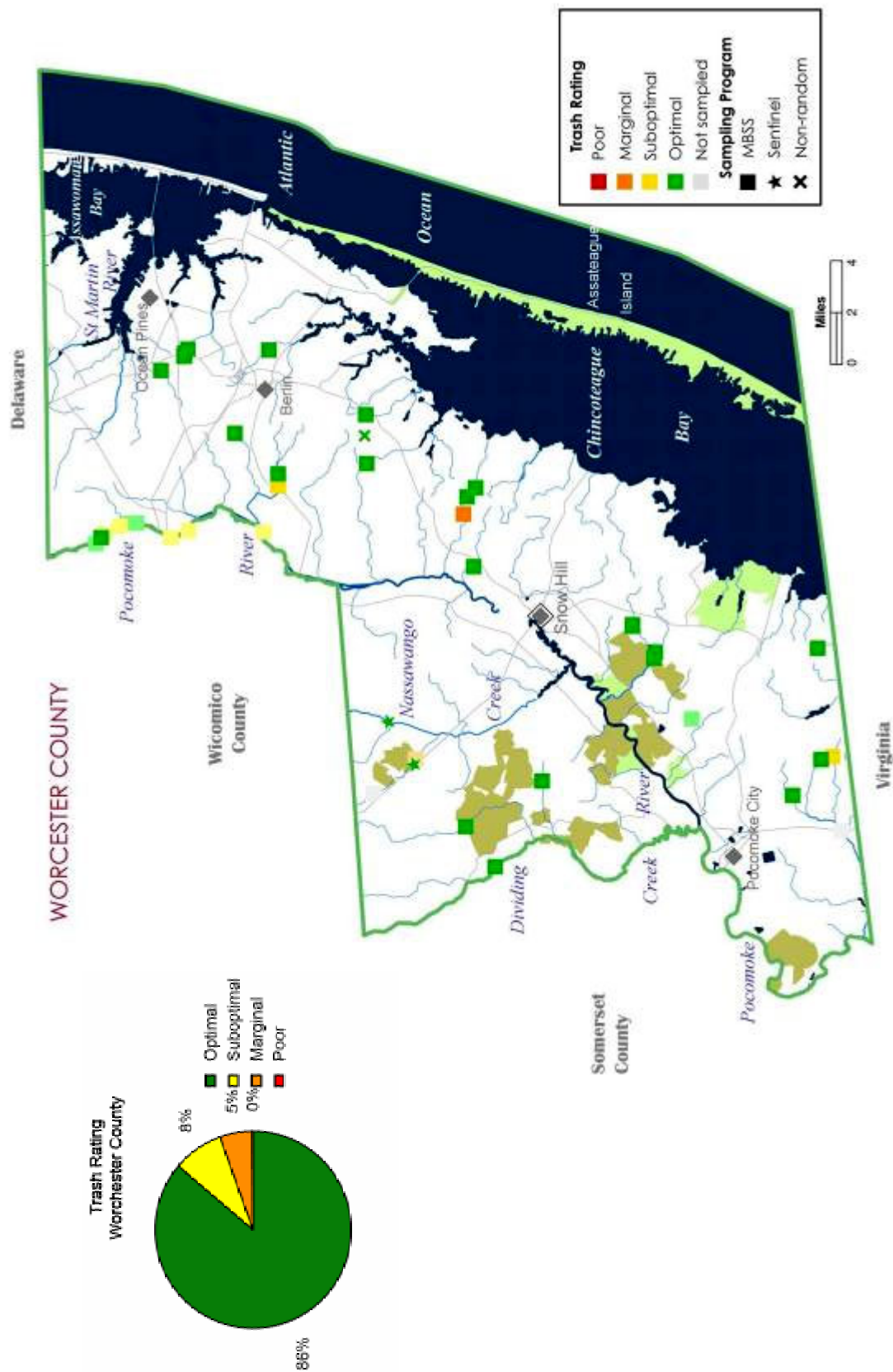


Figure 8-215. Pie chart and map of trash rating (0-20 scale) for Worcester County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only)

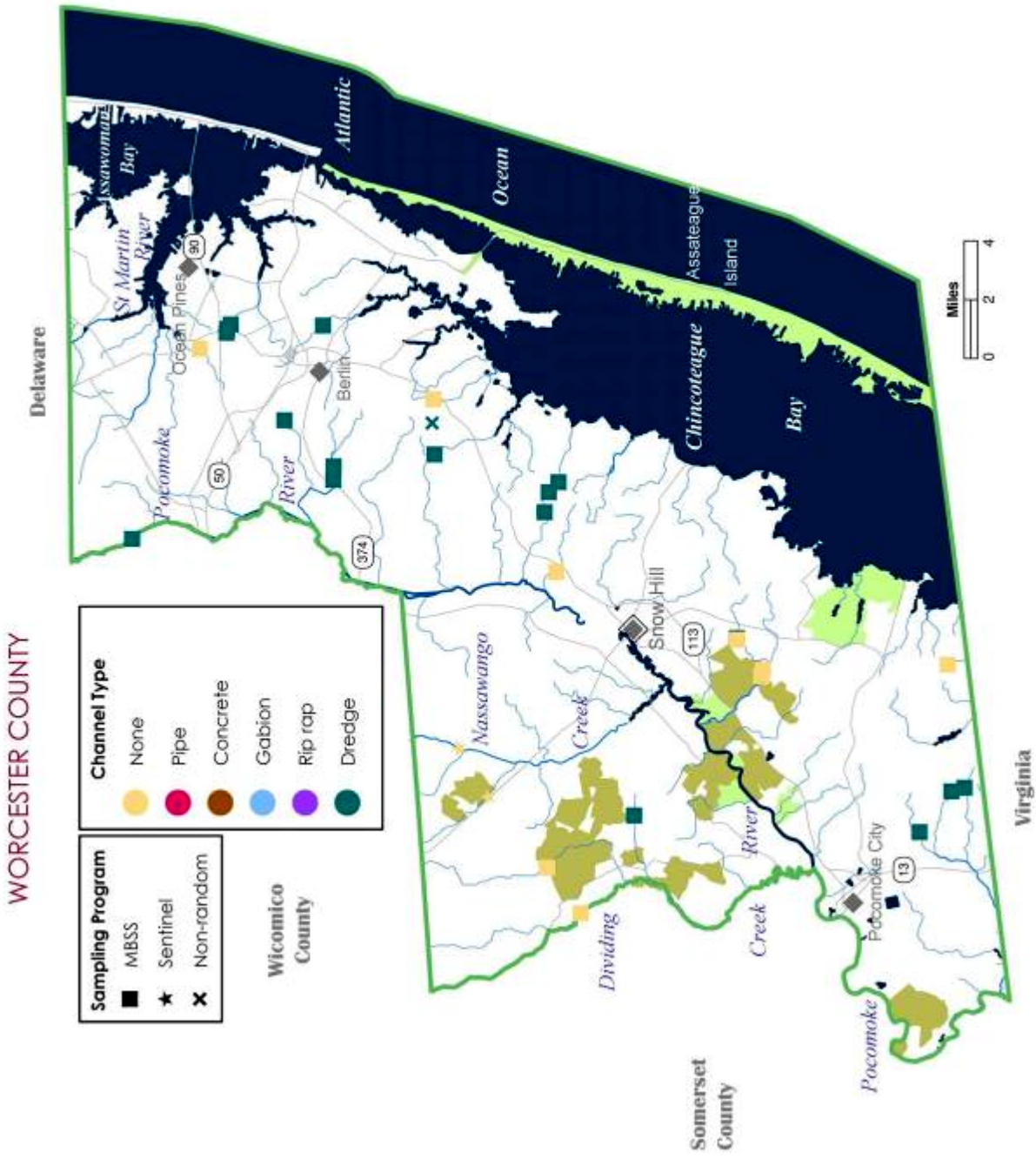


Figure 8-216. Map of channelized sites, by type, for Worcester County streams sampled by the MBSS during 2000-2004. *NOTE: When channelization is indicated, it does not necessarily mean that the entire 75m segment was affected.*

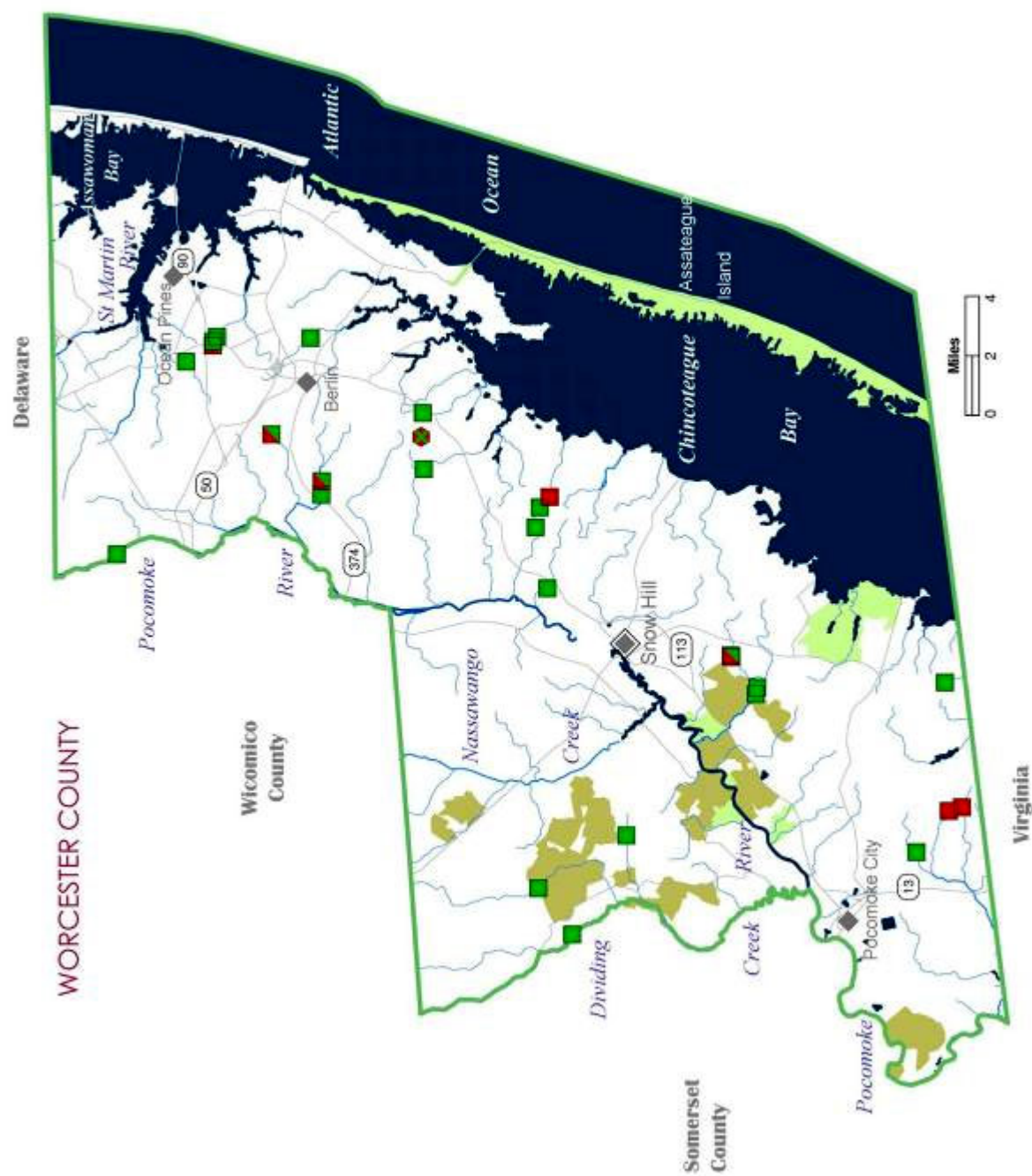


Figure 8-217. Map of sites with inadequate riparian buffers and buffer breaks for Worcester County streams sampled by the MBSS during 2000-2004. NOTE: Multiple riparian buffer breaks sometimes occurred at a site; only the most severe was depicted.

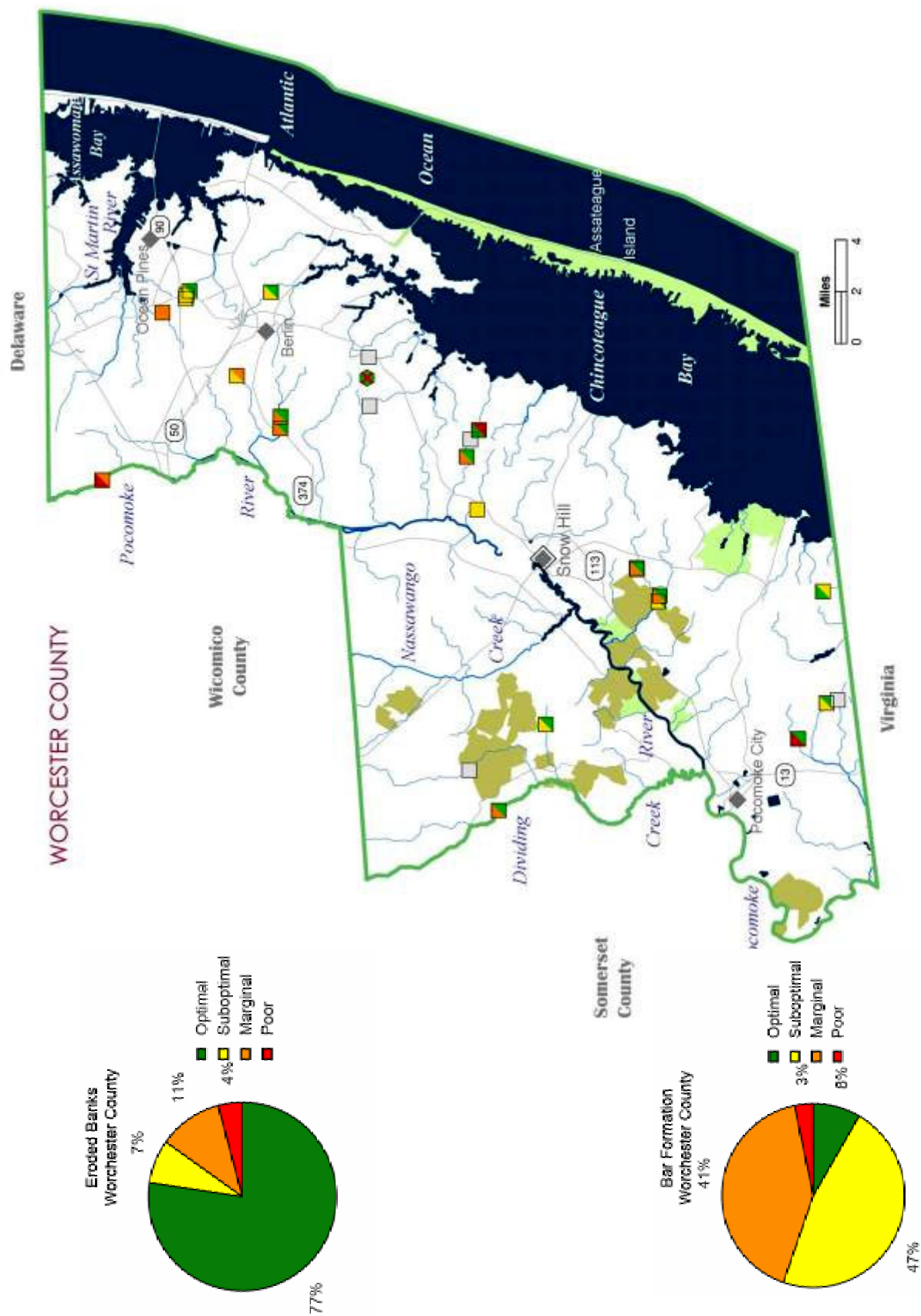


Figure 8-218. Pie charts and map of sites with eroded banks and instream bar formation for Worcester County streams sampled by the MBSS during 2000-2004.

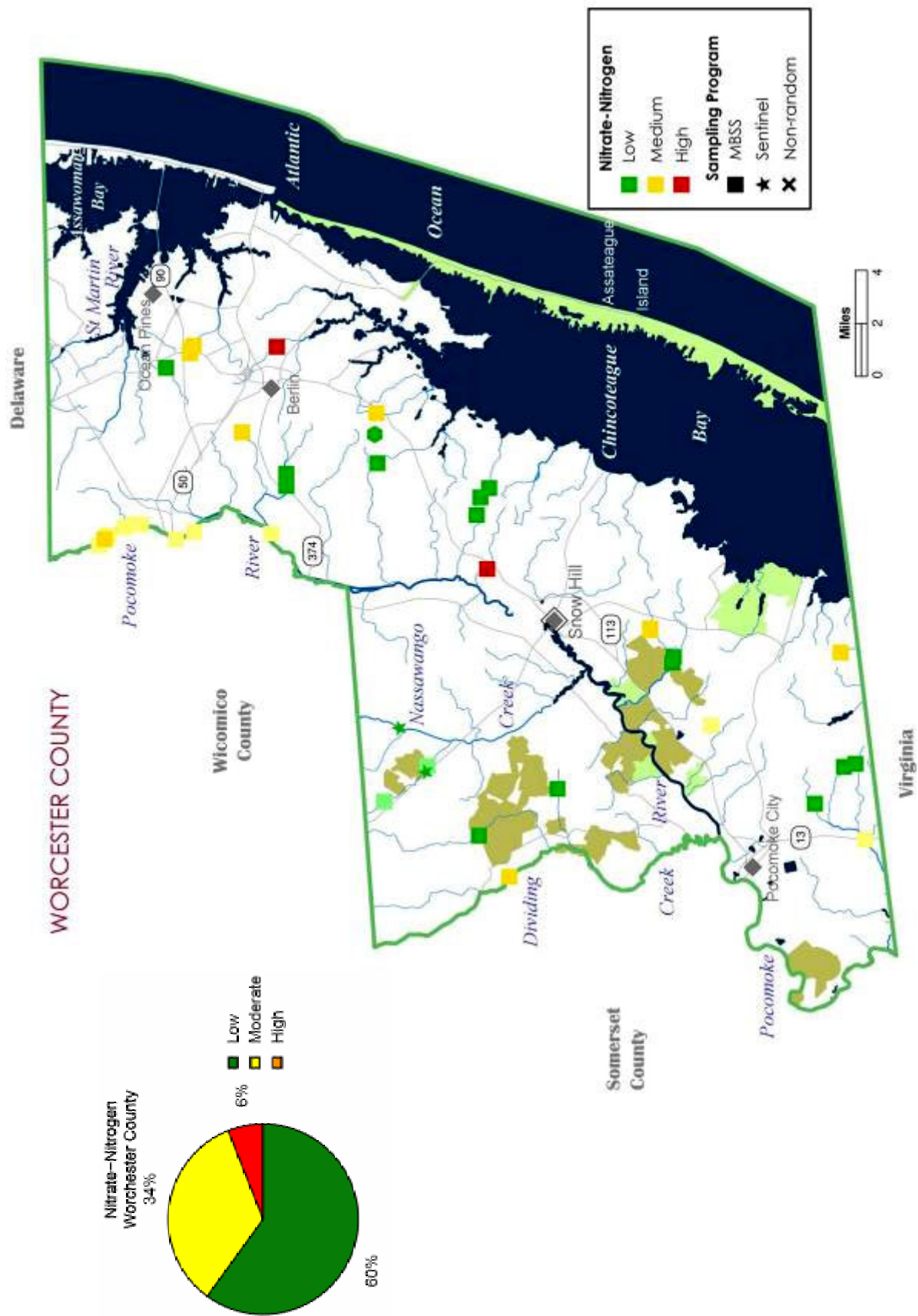


Figure 8-219. Pie chart and map of nitrate-nitrogen values (mg/l) for Worcester County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only) (Low = 1.0, Medium = 1.0 – 5.0, High = > 5.0)

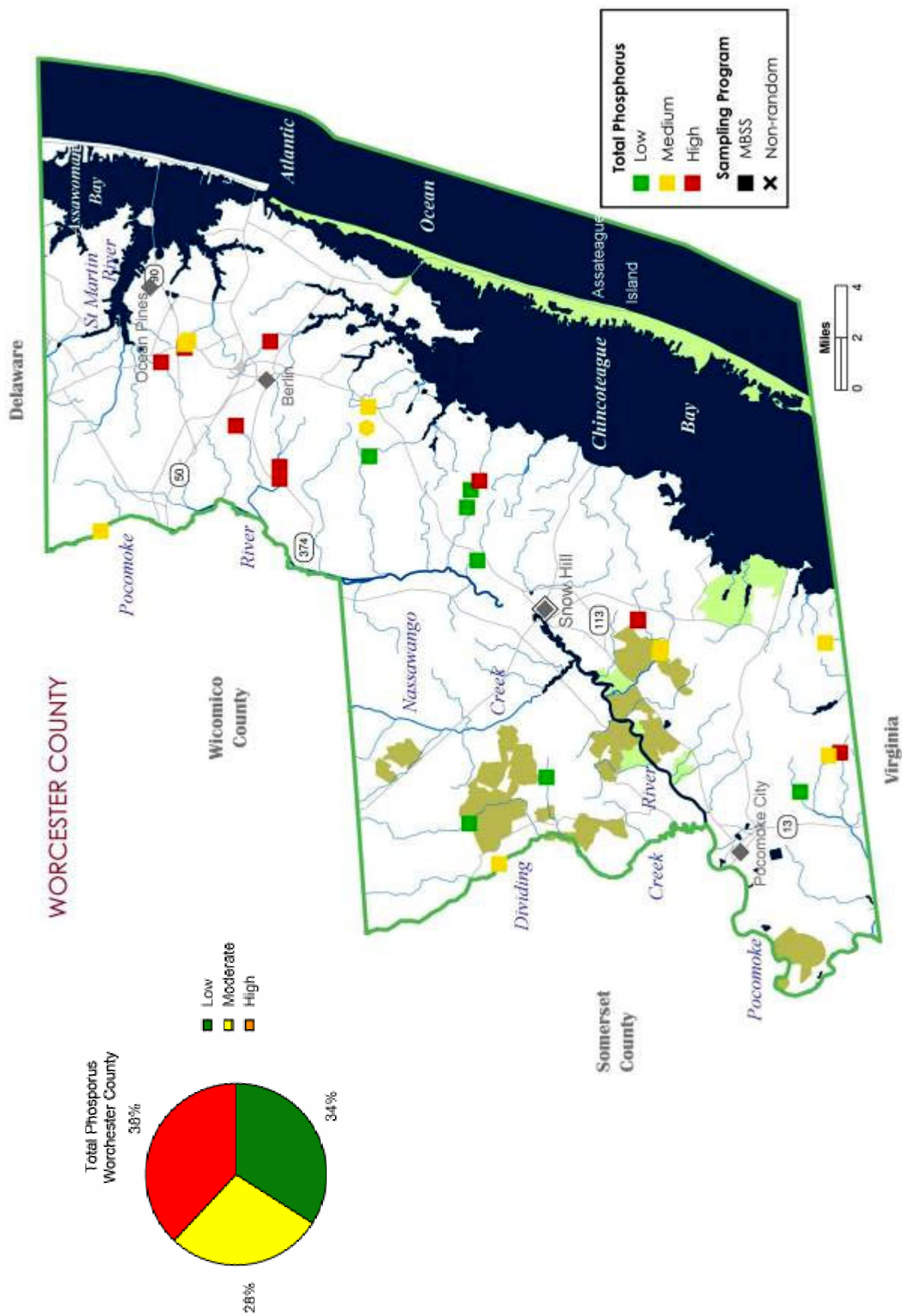


Figure 8-220. Pie chart and map of total phosphorus values ( $\mu\text{g/l}$ ) for Worcester County streams sampled by the MBSS during 2000-2004 (Low =  $< 0.025$ , Medium =  $0.025 - 0.07$ , High =  $> 0.07$ )

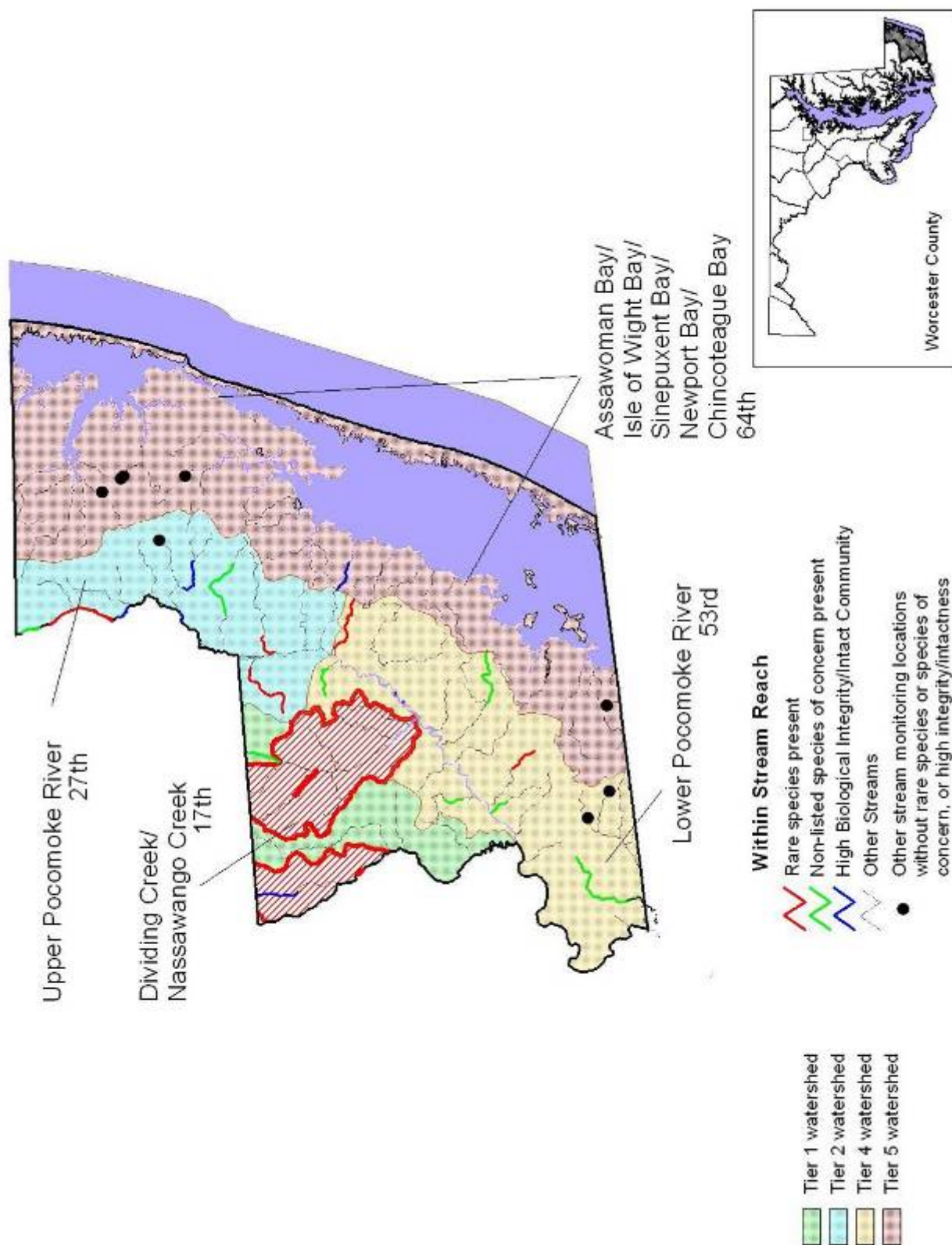


Figure 8-221. Aquatic Heritage Biodiversity Ranking map for Worcester County, by watershed. Data from MBSS 1994-2004, MBSS qualitative data, Raesly, unpub. data, Harris 1975, Thompson 1984, and DNR Natural Heritage Program database.

